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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/598,736	06/21/2000	Toru Takayama	SEL 189	5820

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EXAMINER

VU, HUNG K

ART UNIT PAPER NUMBER

2811

DATE MAILED: 07/18/2002

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/598,736

Applicant(s)

TAKAYAMA ET AL.

Examiner

Hung K. Vu

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 08 April 2002.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-63 is/are pending in the application.
- 4a) Of the above claim(s) 53-63 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-52 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____.
- 4) ☐ Interview Summary (PTO-413) Paper No(s). _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

DETAILED ACTION

Drawings

1. The drawings are objected to under 37 CFR 1.83(a). The drawings must show every feature of the invention specified in the claims. Therefore, the metallic film, the metallic compound film, and the alloy film, as recited in claim 4, and the silicon film having an added impurity element, as recited in claim 40, must be shown or the feature(s) canceled from the claim(s). No new matter should be entered.

A proposed drawing correction or corrected drawings are required in reply to the Office action to avoid abandonment of the application. The objection to the drawings will not be held in abeyance.

Claim Rejections - 35 USC § 102

2. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1 and 2 are rejected under 35 U.S.C. 102(b) as being anticipated by Oikawa et al. (PN 4,770,948, of record).

Oikawa et al. discloses, as shown in Figures 1-2, Col. 2, lines 1-32, and Table 1, a semiconductor device comprising,

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wirings (5) formed over a substrate (1), the wirings comprising tungsten or tungsten compound as a main constituent,

wherein the wirings include at least one inert element, and 90% or more of the inert element is argon, and

wherein an amount of sodium contained within the wirings is equal to or less than 0.3 ppm.

With regard to claim 2, Oikawa et al. discloses the tungsten compound is a chemical compound of : one element, or a plurality of elements, selected from the group consisting of Ta, Ti, Mo, Cr, Nb, and Si; and tungsten.

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 3 and 52 are rejected under 35 U.S.C. 103(a) as being unpatentable over Oikawa et al. (PN 4,770,948, of record).

Although Oikawa et al. does not teach the exact the resistivity and the internal stress, as that claimed by Applicants, the resistivity and the internal stress differences are considered obvious design choices because the resistivity or the internal stress is variable of importance subject to routine experimentation and optimization.

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4. Claims 4, 6-8, 9-11, 13-15, 16, 18-28, 30-35, 37-40, 42-47, and 49-51 are rejected under 35 U.S.C. 103(a) as being unpatentable over Oikawa et al. (PN 4,770,948, of record) in view of Prall et al. (PN 5,341,016).

With regard to claims 4, 28, and 40, Oikawa et al. discloses the wiring comprising the film of tungsten or a tungsten compounds as a main constituent. Oikawa et al. does not the wiring further comprising a nitride film of tungsten and/or silicon film having an added impurity element. However, Prall et al. discloses the wiring having a lamination structure comprising a film (34) of tungsten or a tungsten compound as a main constituent, a nitride film of tungsten (38), and silicon film (32) having an added impurity element. Note Figures 5 and 7, and Col. 5., lines 1-20 of Prall et al.. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to form the wiring of Oikawa et al. having a lamination structure as claimed, such as taught by Prall in order to prevent impurity from diffusing into the wiring and improve the adhesion between the wiring and a gate dielectric film.

With regard to claim 16, Oikawa et al. does not disclose an insulating film comprising SiOxNy formed over the wiring. However, Prall et al. discloses an insulating film (21) comprising SiOxNy formed over the wiring. Note Figures 5 and 7 of Prall et al.. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to form a cap layer over the wiring of Oikawa et al., such as taught by Prall et al. in order to increase the adhesion of the wiring and to protect the wiring during etching.

With regard to claims 9-11, 13, 21-23, 25, 33-35, 37, 45-47 and 49, although Oikawa et al. and Prall et al. do not teach the exact the internal stress, the line width, the resistance, and the

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thickness, as that claimed by Applicants, the internal stress, the line width, the resistance, and the thickness differences are considered obvious design choices because the internal stress, the line width, the resistance, or the thickness is variable of importance subject to routine experimentation and optimization.

With regard to claims 6-8, 18-20, 30-32, and 42-44, Oikawa et al. and Prall et al. do not disclose other inert element (Xe or Kr) is contained within the wiring at an amount equal to or less than 0.1 atom%. However, it would have been obvious to one of ordinary skill in the art at the time the invention was made to form the wiring of Oikawa et al. and Prall having other inert element at an amount equal to or less than 0.1 atom% in order to control the crystal structure of the wiring so that the resistivity of the wiring would be reduced.

With regard to claims 14, 15, 24, 26, 27, 38, 39, 50, and 51, Oikawa et al. and Prall et al. do not disclose the semiconductor device is an active matrix type liquid crystal display, an active matrix type EL display, or an active matrix type EC display, or a video camera, a digital camera, a projector, a goggle type display, a car navigation system, a personal computer, or a portable information terminal. However, it would have been obvious to one of ordinary skill in the art at the time the invention was made to integrate the device of Oikawa et al. and Prall et al. into the devices as claimed in order to perform the desire function.

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5. Claims 5, 12, 17, 29, 36, 41, and 48 are rejected under 35 U.S.C. 103(a) as being unpatentable over Oikawa et al. (PN 4,770,948, of record) in view of Prall et al. (PN 5,341,016) and further in view of Ikeda et al. (JP8-153722, of record).

Oikawa et al. and Prall et al. disclose the wiring is used as a gate of the MOS with the gate insulating film (4). Oikawa et al. and Prall et al. do not disclose the wiring is used as a gate of a TFT. However, Ikeda et al. discloses the wiring is used as a gate of a TFT or MOS with a semiconductor film (104). Note Figure 13 of Ikeda et al.. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to form the wiring of Oikawa et al. and Prall et al. as the gate for the TFT in order to increase the circuitry density.

6. Claims 1-3 and 52 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ikeda et al. (JP8-153722, of record) in view of Oikawa et al. (PN 4,770,948, of record).

Ikeda et al. discloses, as shown in Figure 13, a semiconductor device comprising,

wirings (102₂) formed over a substrate (10₁), the wirings comprising tungsten or tungsten compound as a main constituent,

wherein the wirings include at least one inert element, and 90% or more of the inert element is argon.

Ikeda et al. does not disclose an amount of sodium contained within the wirings is equal to or less than 0.3 ppm. However, Oikawa et al. discloses an amount of sodium contained within the wirings is equal to or less than 0.3 ppm. Note Table 1 of Oikawa et al.. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to form the

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wiring of Ikeda et al. having an amount of sodium contained within the wirings is equal to or less than 0.3 ppm, such as taught by Oikawa et al. improve the performance of the transistor.

With regard to claim 2, Ikeda et al. and Oikawa et al. disclose the tungsten compound is a chemical compound of : one element, or a plurality of elements, selected from the group consisting of Ta, Ti, Mo, Cr, Nb, and Si; and tungsten.

With regard to claims 3 and 52, although Ikeda et al. and Oikawa et al. do not teach the exact the resistivity and the internal stress, as that claimed by Applicants, the resistivity and the internal stress differences are considered obvious design choices because the resistivity or the internal stress is variable of importance subject to routine experimentation and optimization.

7. Claims 4-51 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ikeda et al. (JP8-153722, of record) in view of Oikawa et al. (PN 4,770,948, of record) and further in view of Prall et al. (PN 5,341,016).

With regard to claims 4, 28, and 40, Ikeda et al. and Oikawa et al. disclose the wiring comprising the film of tungsten or a tungsten compounds as a main constituent. Oikawa et al. does not the wiring further comprising a nitride film of tungsten and/or silicon film having an added impurity element. However, Prall et al. discloses the wiring having a lamination structure comprising a film (34) of tungsten or a tungsten compound as a main constituent, a nitride film of tungsten (38), and silicon film (32) having an added impurity element. Note Figures 5 and 7, and Col. 5., lines 1-20 of Prall et al.. Therefore, it would have been obvious to one of ordinary skill in the art

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at the time the invention was made to form the wiring of Ikeda et al. and Oikawa et al. having a lamination structure as claimed, such as taught by Prall et al. in order to prevent impurity from diffusing into the wiring and improve the adhesion between the wiring and a gate dielectric film.

With regard to claim 16, Ikeda et al. and Oikawa et al. do not disclose an insulating film comprising SiOxNy formed over the wiring. However, Prall et al. discloses an insulating film (21) comprising SiOxNy formed over the wiring. Note Figures 5 and 7 of Prall et al.. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to form a cap layer over the wiring of Ikeda et al. and Oikawa et al., such as taught by Prall et al. in order to increase the adhesion of the wiring and to protect the wiring during etching.

With regard to claims 5, 17, 29, and 41, Ikeda et al. and Oikawa et al. disclose the device further comprising a semiconductor film adjacent to the metallic film with an insulating film interposed therebetween.

With regard to claims 12, 36, and 48, Ikeda et al. and Oikawa et al. discloses the metallic film is used as a gate wiring of a TFT.

With regard to claims 9-11, 13, 21-23, 25, 33-35, 37, 45-47 and 49, although Ikeda et al. and Oikawa et al. do not teach the exact the internal stress, the line width, the resistance, and the thickness, as that claimed by Applicants, the internal stress, the line width, the resistance, and the thickness differences are considered obvious design choices because the internal stress, the line

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width, the resistance, or the thickness is variable of importance subject to routine experimentation and optimization.

With regard to claims 6-8, 18-20, 30-32, and 42-44, Oikawa et al. and Prall et al. do not disclose other inert element (Xe or Kr) is contained within the wiring at an amount equal to or less than 0.1 atom%.

With regard to claims 14, 15, 24, 26, 27, 38, 39, 50, and 51, Ikeda et al., Oikawa et al. and Prall et al. do not disclose the semiconductor device is an active matrix type liquid crystal display, an active matrix type EL display, or an active matrix type EC display, or a video camera, a digital camera, a projector, a goggle type display, a car navigation system, a personal computer, or a portable information terminal. However, it would have been obvious to one of ordinary skill in the art at the time the invention was made to integrate the device of Ikeda, Oikawa et al. and Prall et al. into the devices as claimed in order to perform the desire function.

Response to Arguments

8. Applicant's arguments filed 04/08/02 have been fully considered but they are not persuasive.

It is argued, at page 9 of the Remarks, that Oikawa et al. does not disclose the wiring include at least one inert element and 90% or more of inert element is argon. This argument is not convincing because Oikawa et al. discloses, as shown in Col. 1, lines 1-32, sputtering technique

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with argon ion is used as the inert element. Therefore, it is inherent that 90% or more of the inert element is argon.

Conclusion

8. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Hung K. Vu whose telephone number is (703) 308-4079. The examiner can normally be reached on Mon-Thurs 7:00-5:30, Eastern Time.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Tom Thomas can be reached on (703) 308-2772. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 308-7722 for regular communications and (703) 308-7722 for After Final communications.

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Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0956.

Vu

July 13, 2002


Sara Crane
Primary Examiner